account of temporary reversals in deflection which are lost sight of in the general deflections lasting for an indefinite period.

	E.-W. Component.		N.-S. Component.	
	Deflection from *Lows* toward *Highs*	Deflection from *Highs* toward *Lows*	Deflection from *Lows* toward *Highs*	Deflection from *Highs* toward *Lows*
April.....	70.0 %	30.0 %	55.0 %	45.0 %
May.....	95.2	4.8	69.5	30.5
October....	94.7	5.3	62.5	37.5
November.	83.3	16.7	77.7	22.3
December.	100.0	0.0	85.7	14.3
Mean.....	88.5	11.5	69.0	31.0

It will be noticed that the pendulums show greater response to pressure conditions during the fall and winter months than during the spring months. This is to be expected, inasmuch as barometric maxima and minima are best developed during fall and winter. The records for the summer months were not examined critically on this account. The study thus far has been entirely qualitative; quantitative work has been found unsatisfactory owing to the lack of a recording device which shall obviate the running together of the hourly lines at the very frequent times of extreme deflection.

The causes of the movements here described are obscure. Many suggestions regarding the causes of similar movements elsewhere have been made, but no one of them is corroborated as yet by sufficiently wide-spread observation, to warrant its being fully accepted. It would seem that causes which may be operative over long distances must be assumed, for the pendulums at Cambridge show distinct movements in sympathy with barometric maxima and minima when these are still very far distant from the station.

The possibility of using horizontal pendulums in forecasting on windward coasts has been suggested by Mr. F. Napier Denison, of the Meteorological Office at Victoria, B. C. If, as in the case of the Harvard station, horizontal pendulums in general announce the approach of various pressure conditions in advance of the barometer, the use of simple instruments of this type in situations where maps of weather conditions to windward are not available, might lead, especially in the latitudes of the prevailing westerly winds and cyclonic storms, to valuable results.

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A Simple and Efficient Lecture Galvanometer Arrangement

In view of the extensive use to which the lecture galvanometer is nowadays put in physical and other laboratories, I have been induced to describe a particularly simple arrangement which has been thoroughly tested and whose performance leaves little to be desired.

In this arrangement a firm tripod, supported by a convenient shelf on one wall of the lecture room, carries a 90° arc lamp clamped by a right-angle piece to its vertical rod. The lamp is mounted with the positive carbon vertical, and its luminous tip, the source of light, uppermost. On a wall bracket a converging lens with its axis vertical is mounted about a meter above the arc. The galvanometer, a D'Arsonval instrument with plane mirror, is mounted on a wall shelf with its mirror, *A*, about 0.4 meter above the lens and about 0.1 meter nearer the wall. A second and larger plane mirror, *B*, is mounted with universal adjustments at the edge of the galvanometer shelf. It is fixed vertically above the lens in a horizontal plane a little below *A*. A scale with 2-inch divisions is mounted horizontally near the top of the wall opposite the galvanometer about 9.5 meters away. The galvanometer terminals are permanently connected with binding posts on the lecture table.

When the optical adjustments have been made, light from the tip of the positive carbon, converged by the lens, falls upon the mirror *B* and then upon the mirror *A*, which reflects it to the scale. At the center of the scale a round and brilliant image of the luminous carbon tip is formed. Focal adjustments can be made by moving the lens vertically on its bracket, or the lamp vertically on its rod; and the position of the image on

the scale can be adjusted with ease and precision by moving the tripod on its shelf. With the lens used in my apparatus, which is 8 cm. in diameter, the range of the latter adjustment is very great.

The galvanometer mirror used here is § inch in diameter. The lamp can be operated with either direct or alternating current, and the image is so bright that it has never been necessary to darken the room. The inexpensive lamp of the type used here is provided with a metallic hood, and with a pin hole and mica screen for adjusting the arc, which is controlled by hand. As used in this arrangement the edge of the hood is horizontal. While the round image of the carbon tip is sharp enough for all ordinary purposes, readings being taken to tenths of scale divisions, yet if it is desired to make one edge of the image straight and perfectly steady, this can be done simply by laying a bar of metal on the hood and moving it partly over the carbon until the adjustment is correct. By using a larger mirror on the galvanometer a more brilliant image could of course be obtained.

The arrangement described above has been in use here for over a year. During the preceding three years an automatic lamp with vertical carbons and an extra mirror were used instead of the hand regulated 90° lamp. The second arrangement has proved to be more satisfactory than the first. An automatic 90° lamp would of course be still more satisfactory.

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THE AMPHIBIA OF THE MAZON CREEK SHALES

THERE have been but two species of Amphibia recognized from the shales which are exposed along Mazon Creek, Illinois. These two species are the remarkable reptile-like microsaurian *Amphibamus grandiceps* described in 1865 by Professor Cope and the salamander-like branchiosaurian described the past year by the writer under the name *Micrerpeton caudatum*. It is thus with considerable interest that the writer is able to announce the discovery of seven additional species distributed in six additional genera. This new and considerable addition to the knowledge of the Mazon Creek fauna is made possible through the courtesy of Drs. Schuchert and Eaton, of Yale University, who very kindly placed at the writer's disposal the entire collection of Mazon Creek Amphibia belonging to that institution.

The material is represented by ten specimens, including the most perfect example of *Amphibamus grandiceps* so far seen. This specimen makes possible the verification of the author's restoration of that form and the addition of the ischia. The other specimens are undescribed and represent a diverse fauna. An additional species of the family Amphibamidæ is represented by a well-preserved anterior half of a skeleton. Three additional branchiosaurian species are preserved. One of these species, represented by two specimens, is most remarkable for the preservation of the entire alimentary canal and a portion of the oviducts in both specimens. This on comparison with living Amphibia proves to show close resemblances to the alimentary canal of an immature branchiate individual of *Diemyctylus torosus* Eschscholtz from a freshwater pond on Orcas Island in Puget Sound. The other two species are remarkably like *Branchiosaurus* of Saxony, but differ in having an extremely elongate tail.

Perhaps the most interesting discovery in this new material is that of a primitive embolomerous amphibian of the order Temnospondylia. It is related to *Cricotus* and may be placed in the family Cricotidæ. It differs from *Cricotus,* however, in the form of the centrum and the relatively greater length of the component elements. The notochordal canal is widely open. A sixth species is founded on a fore limb which shows relationships to the family Molgophidæ, which has, so far, been known only from the Coal Measures of Linton, Ohio.

Our knowledge of the amphibian fauna of the Pennsylvanian up to the present time would indicate that the forms had already developed into local groups which had few connecting types. We may regard the new